

Turbine Engine Performance Estimation Using Particle Filters, Phase I

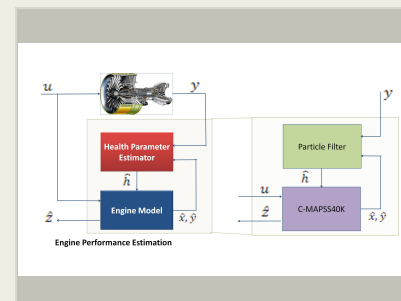
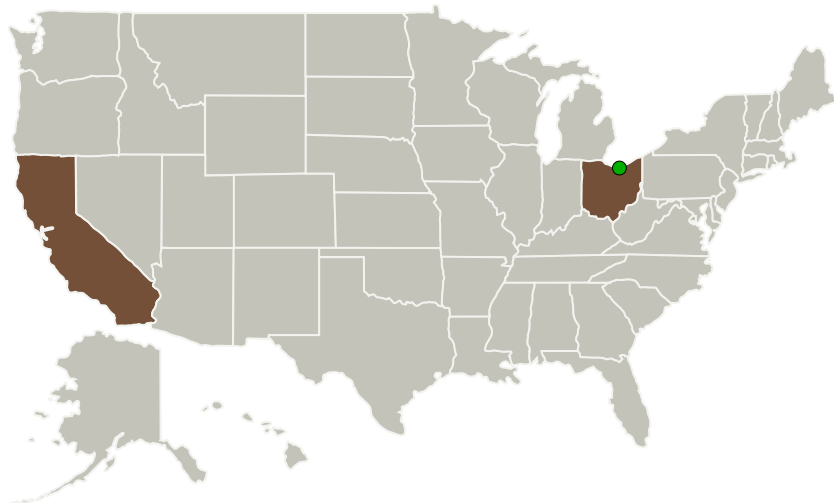
Completed Technology Project (2013 - 2013)



Project Introduction

Development of a nonlinear particle filter for engine performance is proposed. The approach employs NASA high-fidelity C-MAPSS40K engine model as the central element, and addresses the issue of lack of observability of some of the engine health parameters in previous Kalman filter formulations. Proposed approach does not require linearity of the dynamics or Gaussian noise assumptions for satisfactory operation. The feasibility of real-time implementation of the proposed approach will be demonstrated using commercial, off-the-shelf General Purpose Graphical Processing Units. Phase I feasibility demonstration will show that the particle filter formulation of the engine performance monitoring system can overcome the limitations of previously employed approaches. Phase II research will develop a prototype implementation for hardware-in-loop simulations and eventual flight test.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Optimal Synthesis, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

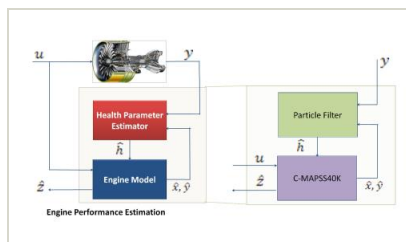
California	Ohio
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Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137466>)

Images

**Project Image**

Turbine Engine Performance Estimation using Particle Filters
(<https://techport.nasa.gov/image/128903>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Optimal Synthesis, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

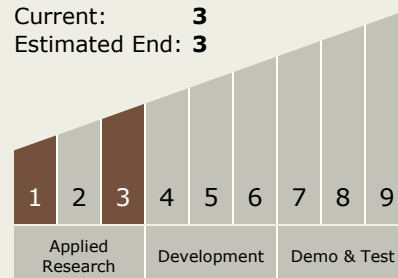
Carlos Torrez

Principal Investigator:

Bong-jun Yang

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.4 Information Processing
 - └ TX11.4.2 Intelligent Data Understanding

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System